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Racial and Ethnic Disparities in Food Insufficiency

Evidence from a Statewide Probability Sample of White, African American, American Indian, and Hispanic Infants

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Racial and Ethnic Disparities in Food Insufficiency: Evidence from a Statewide Probability Sample of White, African American, American Indian, and Hispanic Infants

This study examines racial and ethnic disparities in the experience of food insufficiency among families with infants, focusing on the roles of socioeconomic characteristics. It uses the SEED for Oklahoma Kids baseline survey data collected from a probability sample of white, African American, American Indian, and Hispanic caregivers of infants randomly selected from Oklahoma's birth certificates. Fairlie's extension of the Blinder-Oaxaca decomposition is employed to analyze these data. Results suggest that whites experience food insufficiency at a statistically significantly lower rate than do the three minority groups. Compositional gaps in economic and noneconomic resources are found to explain much of the group differences in levels of food insufficiency. Findings also imply that levels of asset ownership and access to credit are lower among minority groups than among whites and contribute to higher levels of food insufficiency among minority groups.

Key words: *Access to credit; asset ownership; Blinder-Oaxaca decomposition; food insufficiency; racial and ethnic differences in food insufficiency; SEED for Oklahoma Kids*

A substantial number of children—estimated at 17.2 million—live in families that are food insecure; that is, these families are uncertain of their ability to acquire, or unable to acquire, enough food to meet the needs of all members (Nord et al. 2010). Food insecurity among families with children is likely to have long-term negative effects since it is closely related to child well-being outcomes, including health, weight, behavior problems, and cognitive development (Kleinman et al. 1998; Alaimo, Olson, and Frongillo 2001*a,* 2001*b*; Alaimo et al. 2001; Casey et al. 2005; Jyoti, Frongillo, and Jones 2005; Whitaker, Phillips, and Orzol 2006; Bronte-Tinkew et al. 2007; Gershoff et al. 2007). Negative effects of food insecurity during infancy and early childhood are especially pronounced. Inadequate nutritional intake during the first 2 years of life can cause susceptibility to infections and chronic diseases, impede cognitive development, and slow growth. It may also hinder subsequent school performance, increase the likelihood of dropping out, and impede productivity during adulthood (Hoddinott et al. 2008).

Research suggests that the burden of childhood food insecurity is not distributed equally. As with other forms of disadvantage (Keister 2000; Liao et al. 2004; Shapiro 2004), food insecurity is found to be overrepresented among racial and ethnic minority groups (Cutts, Pheley, and Geppert 1998; Rose, Gundersen, and Oliveira 1998; Ribar and Hamrick 2003; Sharkey and Schoenberg 2005; Nord et al. 2010). Nationally, 14.1 percent of white households with children are food insecure, but the percentages are much higher among African Americans at 32.9 percent and among Hispanics at 30.6 percent (Coleman-Jensen et al. 2011).

An obvious explanation for the overrepresentation of food insecurity among racial and ethnic minority groups is the concentration of economic and social disadvantage (Keister 2000; Liao et al. 2004; Shapiro 2004). However, there is little agreement on the extent to which socioeconomic disparities explain racial and ethnic differences in the risk of experiencing food insecurity. Studies employing multivariate analyses report that minority households face a higher risk (Stuff et al. 2004; Bartfeld and Dunifon 2006; Kaiser, Baumrind, and Dumbauld 2007; Gundersen 2008; Yu, Lombe, and Nebbitt 2010), a lower risk (Nord and Romig 2006; Heflin, Corcoran, and Siefert 2007), and no different risk (Laraia et al. 2006) than white households with similar socioeconomic characteristics.

Longitudinal analyses that attempt to control for unobserved heterogeneity often employ econometric methods that do not allow for the identification of a race effect (e.g., fixed-effect models). One exception is David Ribar and Karen Hamrick's (2003) study, which employs food insufficiency, a measure of food-related economic hardship that is somewhat different from food insecurity.[1] Although descriptive statistics suggest that food insufficiency rates are much higher among African Americans and Hispanics than among whites, results from hazard models with controls for socioeconomic factors suggest that African Americans are significantly more likely to move into food insufficiency than are whites; the estimates indicate that Hispanics' chances of entering into and exiting from food insufficiency are not statistically significantly different from those of white counterparts (Ribar and Hamrick 2003).

Helpful as they are, existing studies are not free from limitations. First, previous studies use samples composed mainly of African Americans and Hispanics but not American Indians. To the authors' knowledge, the only study of food insecurity that includes a probability sample of American Indians is by Craig Gundersen (2008). Although American Indians represent a relatively small share of the US population, a unique history and their socioeconomic disadvantage make this a group of special interest.

Second, there is little understanding of the factors that contribute to higher levels of food insecurity among racial and ethnic minority groups than among whites. Most studies include race and ethnicity variables as controls but do not attempt to unpack social and economic processes. Thus, it is unclear whether the excess risk of food insecurity among minority groups is due to the prevalence of socioeconomic disadvantage (compositional differences) in these groups or to something unique about minority groups (structural factors). For example, research suggests that food insecurity is much higher among female-headed families than among two-parent families and is lower among homeowners than among renters (Ribar and Hamrick 2003; Nord et al. 2010). Studies indicate that nonwhite families are more likely to be female headed and less likely to own a home than are white families (Keister 2000; Charles and Hurst 2002; Krivo and Kaufman 2004). Accordingly, higher percentages of female-headed families and lower rates of home ownership among racial and ethnic minority groups may contribute to rates of food insecurity that are higher than those among whites.

In addition, the effects of socioeconomic characteristics on food insecurity may differ by race and ethnicity. For instance, female-headship may have a smaller effect on white families than on their nonwhite counterparts, because white families may receive more economic and noneconomic help from family and friends (Shapiro 2004). The protective effect of home ownership may be smaller

[1] Differences between food insufficiency and food insecurity are discussed in more detail in the Measures section below.

among nonwhite families. On average, minority homeowners have a lower level of home equity than do their white counterparts (Krivo and Kaufman 2004), and this likely affects minority homeowners' chance of getting home equity loans when needed. Third, although it is plausible that assets and access to credit provide possible explanations for why some households with similar income levels are food secure and others are food insecure, existing studies do not directly examine this hypothesis.

To fill these gaps, the current study poses the following questions. To what extent is the disparity in food insecurity explained by compositional differences between whites and racial and ethnic minority groups on economic, noneconomic, and environmental characteristics? How much of the disparity is explained by compositional differences in each factor? To pursue answers, the study analyzes data from a probability sample of infants, and by design, the sample includes a sizeable subsample of American Indians. Data come from birth certificates and a baseline survey conducted as part of the SEED for Oklahoma Kids (SEED OK) experiment. The data are ideal for this study because SEED OK oversampled African Americans, Hispanics, and American Indians. The SEED OK survey collected information on assets (e.g., home and bank account ownership) and access to credit (e.g., credit card ownership) as well as on income and other basic socioeconomic characteristics. A decomposition analysis is conducted to identify the extent to which the disparity among the four racial/ethnic groups can be attributed to compositional differences in socioeconomic characteristics.

Conceptual Model

Research identifies several mechanisms that contribute to food insecurity and food insufficiency, and findings suggest that those mechanisms are associated with family resources, family demands, and individual constraints on coping abilities (Heflin et al. 2007; Heflin and Butler, forthcoming). We consider food insecurity and insufficiency to be phenomena that occur as part of a social and economic process. That process is determined by economic resources, noneconomic resources, and environmental factors.

The risks of food insecurity and insufficiency increase when families lack economic resources to meet their food needs. Income is found to be one of the strongest predictors of food insecurity and insufficiency (Rose, Gundersen, and Oliveira 1998; Ribar and Hamrick 2003; Nord et al. 2010). Financial assets and access to credit may substitute for income (Mayer and Jencks 1989; Nam, Huang, and Sherraden 2008), thereby reducing the risks of food insecurity and insufficiency by providing economic means to get by during times of financial hardship (Ribar and Hamrick 2003). Savings in banks may be used to purchase food when income is low. The risks of experiencing food insecurity and food insufficiency are likely lower among homeowning families than among families in other housing situations. For example, the cost of owning a home is less than the cost of renting one, and home ownership can facilitate borrowing when needed (e.g., home equity loan). Also, access to credit (e.g., credit cards) may prevent a family from going hungry by offering at least temporary means to get by.

The risk of experiencing food insecurity and insufficiency is also tied to noneconomic resources, which can influence consumption and resource management. The risk is likely higher among families with large numbers of children. Mother's education may reduce the risk, since educated mothers may manage their family's finances prudently. Research suggests that the risk of

experiencing food insecurity and insufficiency is negatively associated with families led by married couples, families with native-born parents, and families with employed adults (Nord et al. 2002; Bartfeld and Dunifon 2006).

Environmental factors may also influence a family's chance of experiencing food insecurity or insufficiency. Families living in metropolitan areas may be at higher risk than are their rural counterparts because the likelihood of producing one's own food is lower among those in metropolitan areas and because housing costs are higher. High unemployment rates tend to raise the risks of food insecurity and insufficiency, because weak labor markets tend to decrease communities' resources and have negative effects on household income.

Research Methods

Data and sample

This study uses two sets of data collected for SEED OK: (1) Oklahoma birth certificate data and (2) SEED OK baseline survey data. The SEED OK experiment tests a college savings program for children. The baseline survey provides rich data on infants, their caregivers (mostly mothers), and families in the sample (Nam et al., forthcoming). The survey is completed by the sampled infant's mother or caregiver.

The Oklahoma birth certificate data come from the Oklahoma State Department of Health. The birth certificate data serve as the sampling frame for the SEED OK baseline survey and provide important demographic information. The SEED OK experiment employed a stratified random sampling method to select infants from two sets of birth certificate data: those for infants born between April and June 2007 and those for infants born between August and October 2007.[2] Three minority groups are oversampled to ensure that subgroups of African Americans, American Indians, and Hispanics are sufficiently large for separate analyses (Marks et al. 2008).

With support from the Office of the State Treasurer, the SEED OK research team adopted several strategies to promote study participation among mothers of selected infants. If an infant did not live with his or her mother at the time of the baseline survey, the study attempted to recruit the infant's main caretaker. The team conducted telephone interviews for the baseline survey from fall 2007 though spring 2008 (Marks et al. 2008; Nam et al., forthcoming). Out of 7,115 eligible cases selected from the birth certificate data, 2,704 completed telephone interviews for the baseline survey. The resulting 38 percent participation rate is comparable to those for recent telephone surveys; the 2003 Survey of Consumer Attitudes reported a 48 percent participation rate, and the Pew Research Center's 2003 national survey achieved a rate of 25 percent (Curtin, Presser, and Singer 2005; Keeter et al. 2006).

[2] The SEED OK researchers added a second sample because of lower than expected study participation rate in the first sample. The low participation rate may be explained by the fact that SEED OK asks study participants to provide their infant's Social Security number, which is required to open a college savings account for the infant (the account is the main intervention in the SEED OK experiment). The requirement may limit study participation among those who feel uncomfortable providing this confidential information. Features in SEED OK also may discourage participation. Each sample member has an equal chance of being assigned to the treatment or the control group; if selected into the treatment group, the infant would receive a $1,000 deposit into his or her college savings account. A 50 percent of chance of getting a deposit may make parents suspicious about SEED OK(Nam et al., forthcoming; Marks, Rhodes, and Scheffler 2008).

The birth certificate data are used to compare the characteristics of study participants with those of nonparticipants. Results suggest that the two groups do not differ statistically on most observed characteristics (infant's race and Hispanic origin, gender, and birth weight; mother's marital status and metropolitan residency; and father's age). There are statistically significant differences in mother's age, education, and nativity ($p \leq .05$); however, differences between the means for the two groups are small. The mean age among participating mothers is 25.53 years, and that among nonparticipating ones is 25.22 years. On average, participating mothers have 12.53 years of schooling and nonparticipants have 12.22 years.[3] Although 87 percent of participating mothers are native born, this figure is 84 percent among nonparticipating mothers. The authors cannot rule out the possibility that these two groups are systematically different in unobserved ways, because many characteristics are not included in birth certificates.

From the sample of 2,704 study participants who completed the baseline survey, the authors exclude 26 Asians because estimates for such a small subgroup would not be reliable. Also excluded are 26 cases for which information is missing on the dependent variable ($n = 4$) or on independent variables ($n = 22$). Thus, the final analytical sample consists of 2,652 respondents (1,220 whites, 465 African Americans, 516 American Indians, and 451 Hispanics).

Measures

An indicator of food insufficiency serves as the dependent variable in this study. The food insufficiency indicator differs from the food insecurity measure created using the US Department of Agriculture's (USDA) 18-item food security questions, which is used in recent studies (Gundersen 2008; Nord et al. 2010; Coleman-Jensen et al. 2011). While closely related, food insecurity and food insufficiency have distinct definitions. "Food insecurity" refers to limited or uncertain availability of food due to the lack of economic resources; "food insufficiency" refers to constrained household food stores or insufficient food intake because of insufficient economic resources (Scott and Wehler 1998). The distinction between food insufficiency and food insecurity can best be understood from a temporal frame of reference: food insecurity can be experienced prior to the onset of food insufficiency and may or may not result in food insufficiency (Scott and Wehler 1998). The terms "food insecurity with hunger" and "very low food security" are conceptually comparable to food insufficiency (Dixon, Winkleby, and Radimer 2001). In other words, food insecurity covers broader aspects of food scarcity than food insufficiency. The authors are unable to use a food insecurity measure because the presence of insecurity is assessed with the USDA's full food security module, and completion requires a considerable amount of time; time constraints prevented the researchers from including the full module in SEED OK's baseline survey.

We employ a food insufficiency indicator based on a question in SEED OK's baseline survey: "During the past 12 months, did your family (1) always have enough to eat, (2) sometimes not have enough to eat, or (3) often not have enough to eat?" This item is a slightly modified version of the first screening question in the US Department of Agriculture's Food Security Core-Module Questionnaire, which serves as a reasonable alternative to use of the full food security module

[3] The mother's education variable used in comparing study participants and nonparticipants differs from that in main analyses reported below. The former comes from birth certificate data because information on both participants and nonparticipants is needed. The latter is created from the baseline survey data. For some infants, main caretakers are not birth mothers (e.g., in some cases grandparents), and information on such caretakers is not available from birth certificates.

(Bickel et al. 2000). Responses to this question are used to create the food insufficiency variable by assigning a value of 0 to those who indicate that their families always had enough to eat and a value of 1 to others.

This study uses the race and ethnicity variable created with the racial and ethnic identifications recorded on birth certificates. The racial and ethnic identification on certificates uses categories prescribed by the Vital Statistics protocol established by the National Center for Health Statistics (Buescher, Gizlice, and Jones-Vessey 2005; Marks et al. 2008). The resulting race and ethnicity variable consists of four categories: non-Hispanic whites (whites), non-Hispanic African Americans (African Americans), non-Hispanic American Indians (American Indians), and Hispanics.

The study also employs a series of socioeconomic and environmental variables identified in the conceptual model. Economic resource variables include income, assets, and access to credit. The study uses two income variables. The first of these, an indicator that income information is missing, is generated because a substantial minority of the sample did not answer the question about household income (n = 102). The authors create this variable by assigning a value of 1 to those without household income information and 0 to others. The second income measure, household income, is a continuous variable that captures total household income during the 12 months prior to the baseline survey. To ensure that the analyses include the 102 cases lacking household income information, the authors assign 0 as the value for the household income of those cases.

The study has three variables for measuring assets and access to credit: home ownership, bank account ownership, and credit card ownership. The home ownership measure codes those who own a home as 1, while renters and those living in other arrangements are coded as 0. For a majority of households in the United States, housing assets are the major illiquid assets, and housing assets represent the largest portion of household wealth (Carasso and McKernan 2008). The bank account ownership variable categorizes participants as those with a checking or savings account (coded as 1) and others (coded as 0). To avoid the issue of endogeneity, we use bank account ownership instead of the amount of liquid asset; if they encountered economic difficulty during the observation period, families likely spent savings to avoid experiencing food insufficiency. In addition, bank account ownership indicates an established relationship with the mainstream banking industry. Access to credit is measured by credit card ownership; a value of 1 is given to those who have a major credit card, and 0 to others.

Noneconomic household characteristics are measured with six variables: study participant's age, education, marital status, and nativity; study participant's or partner's work status; and the number of children in the household. The categorical measure of participant's age employs three groups: younger than 20 years, 20–29 years, and 30 or older. The variable capturing participant's education also uses three groups: less than high school diploma, high school diploma (including general equivalency diploma), and college degree (associate's degree, bachelor's degree, or more education). Participant's marital status is captured with a dichotomous measure (participants married at the time of the baseline are coded as 1, otherwise 0). The variable for mother's nativity is created using birth certificate data. A value of 1 is assigned to those born in the United States or its territories (e.g., Puerto Rico and Guam), and a value of 0 is assigned to others. The work status variable measures whether the study participant, or the participant's spouse or partner, reportedly worked for pay in the week prior to the baseline survey (coded as 1 if work is reported and as 0 if not). The number of

children in the household is measured in four groups: one child, two children, three or more children, and information missing.

The study includes two environmental variables. First, a measure of unemployment rate is created using information from the Bureau of Labor Statistics on the county-level rate in 2007 (2012). The authors merge unemployment rate data and SEED OK survey data by using county name. Second, a metropolitan residency variable is generated by matching data from the SEED OK baseline survey with data from the State of Oklahoma (n.d.). To protect study participants' confidentiality, SEED OK provided the authors with only the first three digits of participants' five-digit zip code. The state data employ the US Census Bureau's classification to determine whether five-digit Zip Code Tabulation Areas are characterized as metropolitan, nonmetropolitan, or mixed. This study matches each respondent's three-digit zip code to the state data in order to assign each respondent a value for the dichotomous residency variable (1 = household in metropolitan area [hereafter, metropolitan residency], 0 = household in nonmetropolitan area).

Statistical analyses

We use decomposition, an approach employed in studying group differences. Decomposition sorts out racial and ethnic disparity in food insufficiency experience caused by compositional differences in economic, noneconomic, and environmental characteristics from those caused by structural factors (e.g., racial and ethnic group differences in effects of home ownership on food insufficiency; Oaxaca 1973; Fairlie 1999, 2005).

Since the standard Blinder-Oaxaca decomposition technique is based on the linearity of the ordinary least squares function, we use Robert Fairlie's (2005) extension of the Blinder-Oaxaca decomposition method. Fairlie developed the extension for use with dichotomous dependent variables (Oaxaca 1973; Fairlie 1999, 2005). According to the method, a group difference in an outcome measure (e.g., the probability of experiencing food insufficiency among whites subtracted from that among a minority group) can be separated into the following two terms:

$$[\sum_{i=1}^{N_W}\frac{F(X_{i,W}*\hat{\beta}_W)}{N_W}-\sum_{i=1}^{N_M}\frac{F(X_{i,M}*\hat{\beta}_W)}{N_M}]+\ [\sum_{i=1}^{N_M}\frac{F(X_{i,M}*\hat{\beta}_W)}{N_M}-\sum_{i=1}^{N_M}\frac{F(X_{i,M}*\hat{\beta}_M)}{N_M}] \quad (1)$$

or

$$[\sum_{i=1}^{N_W}\frac{F(X_{i,W}*\hat{\beta}_M)}{N_W}-\sum_{i=1}^{N_M}\frac{F(X_{i,M}*\hat{\beta}_M)}{N_M}]+\ [\sum_{i=1}^{N_W}\frac{F(X_{i,W}*\hat{\beta}_W)}{N_W}-\sum_{i=1}^{N_W}\frac{F(X_{i,W}*\hat{\beta}_M)}{N_W}] \quad (2)$$

where F is a cumulative distribution function of the standard normal (probit function); $X_{i,R}$ is a vector of economic, noneconomic, and environmental characteristics of family *i* in group *R* ($_M$ denotes racial or ethnic minority group of interest [e.g., American Indians], and $_W$ refers to whites); $\hat{\beta}_R$ is a vector of probit regression coefficients estimated for group R; and N_R indicates the sample size for Group *R*.

The first term in each of the two equations ($[\sum_{i=1}^{N_W} \frac{F(X_{i,W} * \hat{\beta}_W)}{N_W} - \sum_{i=1}^{N_M} \frac{F(X_{i,M} * \hat{\beta}_W)}{N_M}]$ in the first equation and $[\sum_{i=1}^{N_W} \frac{F(X_{i,W} * \hat{\beta}_M)}{N_W} - \sum_{i=1}^{N_M} \frac{F(X_{i,M} * \hat{\beta}_M)}{N_M}]$ in the second) represents differences in the food insufficiency experience rate caused by compositional differences (i.e., different distribution of X). The second term in each equation measures the extent to which disparity in food insufficiency is explained by differences in coefficient sizes and the proportion caused by group differences in unobserved characteristics. Following Fairlie (1999, 2005), we focus on the first terms, because interpreting results on the unexplained portion (portion caused by unobserved characteristics) of the disparity is difficult.

As equations (1) and (2) show, Fairlie's decomposition differs from Blinder-Oaxaca decomposition in the way that it estimates predicted values for an outcome measure. The standard Blinder-Oaxaca decomposition uses the mean values of independent variables to calculate a predicted outcome measure. . In contrast, Fairlie's decomposition uses a matching method. Following Fairlie (1999, 2005), the current analyses use predicted probabilities to match cases from two groups. For example, a white study participant who has the highest probability in experiencing food insecurity among whites is matched with a nonwhite who has the highest probability in that nonwhite group. Then, predicted probabilities are calculated using the values of independent variables of the matched cases. The next step is to average predicted probabilities for each group: whites and a minority group. This enables calculation of the difference between average values of the two predicted probabilities if two groups have the same distribution of independent variables. Since the size of the white subsample is much larger than that of the three minority subsamples, the authors randomly select the same number of whites as of minority group members. Because the estimates for whites are sensitive to sample selection, this study generates 1,000 subsamples of whites and averages estimates from 1,000 analyses (Fairlie 1999, 2005).

In addition to an overall decomposition that estimates the total contribution of compositional differences in all independent variables in the model, we conduct detailed decompositions to estimate the effects of each independent variable (or a set of related variables). The detailed decompositions borrow the value of a specific variable of interest from matched cases while keeping the values of other variables intact; this enables the authors to assess the role of compositional difference in a specific variable (or a set of variables) in explaining racial and ethnic disparities in food insufficiency experience. Since predicted probabilities are sensitive to the order in which independent variables are entered into analyses, we randomize the ordering of variables in replications so that the final estimation approximates an average of the results over all possible orderings.

Because decomposition results differ by regression coefficients used, we present two separate sets of results: one based on coefficients from a probit regression with the white subsample [equation (1)] and another based on coefficients from that with each minority group [equation (2)]. All statistical analyses use weighted data; a weight variable is created to consider oversampling of minority groups and nonresponse bias (Marks et al. 2008).

Supplementary analyses are run to check the robustness of findings. One model analyzes a sample consisting only of respondents who are mothers of infants, not other caregivers (e.g., grandparents).

Another model is estimated with continuous (age and age squared) instead of categorical age variables. Results from these two sets of analyses do not substantively differ from those of main analyses reported in this paper. In addition, the authors conduct decompositions using the coefficients from pooled samples that consist of two racial and ethnic groups (e.g., whites and American Indians). For all but two variables, these pooled-sample estimates are substantively identical to those based on white coefficients.[4] (Results from supplemental analyses are available from the authors upon request.)

Analysis Results

Table 1 details estimated economic, noneconomic, and environmental characteristics of the four racial and ethnic groups. As we expected, whites have clear advantages over the other groups. Average household income is much higher among whites than among the other groups. The percentages of respondents who own homes, bank accounts, and credit cards are all greater among whites than among the three minority groups; white infants in this sample are more likely to have caregivers (mostly mothers) with a college degree, and their parents are more likely to be married.

In comparison with other minority groups, American Indians fare better on measures of household income and asset ownership (home, bank account, and credit card ownership). It is notable that the proportion of married caregivers is much lower among African Americans (less than 25 percent) than among other groups. Not surprisingly, the percentage of native-born mothers and the educational achievement of mothers are much lower among Hispanics than among the other groups. In terms of environmental factors, the percentage of study participants living in metropolitan areas is highest among African Americans and lowest among American Indians.

Table 2 reports estimated rates of food insufficiency by race and Hispanic origin. Reflecting their advantages, the percentage of whites experiencing food insufficiency is significantly lower than that of the three other groups. Although higher than among whites, the percentage among American Indians is statistically significantly lower than among the other two minority groups. The estimated difference between African Americans and Hispanics is not statistically significant.

Table 3 summarizes results from decomposition analyses.[5] Because rates of food insufficiency are lowest among whites, they serve as the reference group. The table's first two columns compare

[4] The two exceptions are mother's nativity status and the number of children. The estimates indicate that mothers' nativity status is not statistically significant in any analysis based on white coefficients. If pooled-sample coefficients are used to compare whites and African Americans and to compare whites and Hispanics, mother's nativity is statistically significant at the .05 level. As shown below, estimations with white coefficients produce different results. In a decomposition analysis comparing whites and Hispanics, results from models with the white coefficients suggest that the number of children in the household is statistically significant at the .10 level, but estimates from models with the pooled-sample coefficients indicate that the number of children is not statistically significant.

[5] As described in the Methods section, decomposition analyses are based on probit regressions. The probit regressions produce expected results. Economic resources are estimated to decrease the risk of experiencing food insufficiency. Income is negatively and statistically significantly associated with food insufficiency among all groups but African Americans; the estimated coefficients for home ownership and credit card ownership among whites are negative and statistically significant. So too, the coefficient for African American bank account ownership is negative and statistically significant. Noneconomic characteristics are also estimated to affect one's risk of experiencing food insufficiency. Among American Indians and Hispanics, participants 30 years old or older are more likely to experience food insufficiency than are those younger than age 20. Among whites and African American respondents, a college

Table 1. Sample Characteristics by Race and Hispanic Origin

	Whites	African Americans	American Indians	Hispanic
Economic resources:				
Household income (mean dollars)**	48,407	19,809	28,433	21,488
Household income missing (%)**	2.17	2.51	3.25	8.80
Home ownership (%)**	49.62	17.18	31.52	26.62
Bank account ownership (%)**	85.59	66.13	72.28	58.44
Credit card ownership (%)**	48.57	25.06	28.63	27.27
Noneconomic household characteristics:				
Age (%):**				
Younger than 20	9.30	15.69	16.09	13.28
20–29	61.72	63.57	64.78	62.00
30 or older	28.98	20.74	19.13	24.72
Education (%):**				
Less than high school diploma	16.12	22.18	27.58	53.71
High school diploma	54.69	62.84	58.34	38.78
College degree	29.20	14.99	14.08	7.51
Married (%)**	69.21	24.63	54.23	54.08
Native-born (%)**	99.05	95.80	99.28	38.76
Employed (%)**	82.62	62.36	72.43	72.43
Number of children (%):**				
1 child	37.80	28.88	34.65	24.61
2 children	34.01	33.88	32.70	32.86
3 or more children	27.28	36.15	31.29	39.54
Missing	0.91	1.09	1.35	2.99
Environmental factors:				
Metropolitan residency (%)**	63.82	86.93	50.12	78.75
Unemployment rate (mean)**	3.82	4.14	3.73	3.90
Unweighted sample size	1,220	465	516	451

Notes: In statistical tests of group differences, Pearson's χ^2 is used for categorical variables and adjusted Wald tests are used for continuous variables.

* $p < .05$; ** $p < .01$.

degree is assessed to lower risk of food insufficiency but a large number of children (three or more) is estimated to increase the risk; Native-born African Americans and Hispanics are statistically significantly less likely to experience food insufficiency than are their foreign-born counterparts. Neither environmental factor is estimated to be statistically significantly associated with one's risk of experiencing food insufficiency. (Full results of probit regressions are available from authors.)

Table 2. Food Insufficiency by Race and Hispanic Origin

	Whites	African Americans	American Indians	Hispanics
Percent	11.50	22.98	16.67	26.66
Unweighted sample size	1,220	465	516	451

Note: Differences are statistically significant ($p < .05$) between whites and African Americans, whites and American Indians, whites and Hispanics, African Americans and American Indians, and American Indians and Hispanics.

whites and African Americans. Results in the first column (model 1) are based on coefficients from a probit regression with the white subsample, and those in the second (model 2) are based on coefficients from a probit regression with the African American subsample. In model 1, household income, home ownership, and credit card ownership are estimated to explain statistically significant portions of the white vs. African American difference in food insufficiency. For example, household income is estimated to reduce the white vs. African American gap by 3.86 percentage points, about one-third of the racial gap in food insufficiency. If coefficients from the African American sample are employed (model 2), a gap in bank account ownership is estimated to explain 18 percent of the racial disparity in food insufficiency. Although not statistically significant, the result for credit card ownership in model 2 is estimated to explain a substantial portion of white–African American disparity in food insufficiency experience (8 percent).

The results for total economic resources from Model 1 suggest that white vs. African American disparity in food insufficiency would decline by 7.26 percentage points (63 percent of group difference) if the two groups have the same levels of economic resources. The estimation in model 2 (based on African American coefficients) also suggests that the white vs. African American gap in total economic resources explains a substantial proportion of the difference between the two groups in food insufficiency (a 4.10 percentage-point decline out of an observed difference of 11.48 percentage points).

The table also reports results on noneconomic resources. In both models, differences in mother's education and the number of children are estimated to explain a statistically significant portion of the white vs. African American gap in food insufficiency. Specifically, the estimates suggest that between 9 and 11 percent of the disparity is explained by the gap in mother's education, and between 5 and 10 percent is explained by the gap in the number of children. Overall, total noneconomic resources are estimated to explain a substantial portion of white vs. African American gap in food insufficiency (22 percent in model 1 and 41 percent in model 2).

Results on environmental factors suggest that neither metropolitan residency nor the unemployment rate explains a statistically significant portion of the racial gap in food insufficiency. Altogether, compositional differences in these two environmental factors contribute a smaller portion of racial disparity in food insufficiency than do economic and noneconomic resources.

Table 3. Decomposition Analyses: Food Insufficiency by Race and Hispanic Origin

	Whites vs. African Americans		Whites vs. American Indians		Whites vs. Hispanics	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Economic resources:						
Household income:						
Change[a]	-3.86	-0.21	-1.69	-2.46	-2.62	-3.96
SE	1.56*	1.31	.70*	.99*	1.18*	1.54*
% group difference[b]	-33.66	-1.83	-32.77	-47.50	-17.26	-26.09
Home ownership:						
Change[a]	-1.97	-.86	-1.11	.30	-1.44	-.82
SE	.83 *	1.47	.47*	.74	.65*	.90
% group difference[b]	-17.12	-7.45	-21.42	5.89	-9.51	-5.42
Bank account ownership:						
Change[a]	-.40	-2.08	-.26	.17	-.56	-.57
SE	.77	1.07^{+}	.50	.56	1.09	1.39
% group difference[b]	-3.46	-18.15	-4.95	3.25	-3.72	-3.73
Credit card ownership:						
Change[a]	-1.04	-.97	-.85	-1.12	-1.01	-.85
SE	.55^{+}	.76	.44^{+}	.83	.59^{+}	.86
% group difference[b]	-9.02	-8.41	-16.45	-21.75	-6.67	-5.60
Economic resources, total:						
Change[a]	-7.26	-4.10	-3.89	-3.15	-5.60	-6.22
SE	1.70 **	1.82*	.88**	1.21**	1.82**	1.84**
% group difference[b]	-63.24	-35.71	-75.24	-60.93	-36.94	-41.03
Noneconomic resources:						
Age:						
Change[a]	-.13	.46	-.14	1.13	-.08	.13
SE	.36	.46	.37	.73	.20	.40
% group difference[b]	-1.15	4.01	-2.70	21.90	-.51	.88
Education:						
Change[a]	-.98	-1.26	-1.19	-.71	-3.08	-.45
SE	.42*	.62*	.60*	.90	1.85^{+}	1.86
% group difference[b]	-8.57	-11.00	-23.01	-13.80	-20.33	-3.00
Married:						
Change[a]	-1.05	-1.48	-.34	-.31	-.37	-.93
SE	1.29	2.07	.43	.60	.46	.56^{+}
% group difference[b]	-9.14	-12.90	-6.66	-5.96	-2.44	-6.16
Native-born:						
Change[a]	-.01	-1.17	.00	.01	-.35	-7.57
SE	.18	.36**	.04	.10	6.19	2.70**
% group difference[b]	-.08	-10.15	.02	.27	-2.28	-49.93
Number of children:						
Change[a]	-.62	-1.10	-.28	.01	-1.09	.87
SE	.33^{+}	.53*	.22	.20	.60^{+}	.71

% group difference[b]	-5.39	-9.60	-5.40	.11	-7.17	5.75
Employed:						
Change[a]	.31	-.14	.15	.00	.13	-.01
SE	.73	.90	.36	.41	.31	.39
% group difference[b]	2.69	-1.20	2.88	.08	.83	-.08
Noneconomic resources, total:						
Change[a]	-2.50	-4.69	-1.80	.16	-4.83	-7.99
SE	1.42 +	2.23*	.75*	1.14	6.86	3.22*
% group difference[b]	-21.78	-40.85	-34.82	3.09	-31.86	-52.70
Environmental factors:						
Metropolitan residency:						
Change[a]	-.41	-1.17	.16	.32	-.31	-.05
SE	.68	1.13	.29	.48	.52	.90
% group difference[b]	-3.54	-10.20	3.17	6.28	-2.07	-.32
Unemployment rate:						
Change[a]	.15	.39	-.03	-.02	.03	-.19
SE	.39	.74	.12	.11	.11	.23
% group difference[b]	1.27	3.41	-.52	-.32	.20	-1.27
Environmental factors, total:						
Change[a]	-.26	-.79	.14	.31	-.29	-.23
SE	.68	1.28	.28	.47	.51	.88
% group difference[b]	-2.26	-6.88	2.71	6.00	-1.91	-1.52
All variables:						
Change[a]	-10.01	-9.58	-5.57	-2.67	-10.76	-14.39
SE	2.04**	2.26**	.80**	1.02**	7.50	2.49
% group difference[b]	-87.20	-83.45	-107.74	-51.64	-70.98	-94.92
Observed difference	11.48		5.17		15.16	

Note: Model 1 is estimated using coefficients from the white sample, and model 2 using those from each minority sample.

[a] Estimated change if a minority group has the same characteristics as whites.

[b] Percentage of group difference explained by compositional gap between whites and the minority group.

$^{+}$ $p < .1$; * $p < .05$; ** $p < .01$.

Results in the last section of table 3 suggest that gaps in observed characteristics explain most of the group difference between whites and African Americans in the experience of food insufficiency.

Over 80 percent of the white vs. African American gap disappears if African Americans have the same economic, noneconomic, and environmental characteristics as whites.

The third and fourth columns of table 3 present decomposition results from comparisons of whites and American Indians. Results in both models suggest that compositional differences in economic resources play an important role in the experience of food insufficiency. The estimates from model 1 (based on white coefficients) indicate that racial differences in household income, home ownership, and credit card ownership explain a statistically significant portion of the group disparity in food insufficiency. If American Indian coefficients are used (model 2), only household income is estimated to be statistically significant. Compositional differences in the total economic resources explain 61–75 percent of disparity in food insufficiency experience between whites and American Indians. In comparison with the role of economic resources, the effect of noneconomic resources is assessed to be smaller. Only education is estimated to account for a statistically significant portion of the racial disparity in model 1. If the roles of total economic and noneconomic resources are compared, total noneconomic resources are estimated to explain much less of the white vs. American Indian disparity than do total economic resources. In model 1, total economic resources explain 76 percent of the white–American Indian disparity, but total noneconomic resources account for only 35 percent. In model 2 (which uses American Indian coefficients), the result for total noneconomic resources is close to zero, suggesting that the white vs. American Indian disparity in food insufficiency would not change if both groups share the same characteristics. As with models comparing whites and African Americans, those comparing whites and American Indians indicate that environmental factors explain little of the difference between the groups. Results from the model using white coefficients suggest that compositional differences in all measured variables explain 108 percent of the white vs. American Indian disparity. This finding suggests that American Indians' risk of food insufficiency is lower than that of whites if the two groups have the same economic, noneconomic, and environmental characteristics. In addition, estimates from the model using American Indian coefficients (model 2) indicate that a considerable portion of the white vs. American Indian gap in food insufficiency (52 percent) is explained by compositional differences in economic, noneconomic, and environmental characteristics.

The two rightmost columns in table 3 present results from comparisons of whites and Hispanics. The estimated patterns on economic resources are similar to those in the models comparing whites and American Indians, but the estimated role of each economic factor is weaker in the white vs. Hispanic comparison. In model 1 (estimated with white coefficients), the calculated values for household income, home ownership, and credit card ownership are negative and statistically significant, but only the result for household income is significant in model 2. In both models, total economic resources are estimated to explain about 40 percent of the white vs. Hispanic gap in food insufficiency. Noneconomic resources also explain a substantial portion of that disparity. It is of particular interest that a compositional difference in mothers' nativity status is estimated to explain about half of the group disparity in food insufficiency in model 2 (a 7.57 percentage-point reduction in the white vs. Hispanic difference in experience of food insufficiency). Here, as in the other decomposition analyses, environmental factors are estimated to account for little of the gap between the two groups in food insufficiency experience. As indicated in the preceding results, estimates in the two white vs. Hispanic models suggest that all measured variables explain most of the disparity in food insufficiency: 71 percent in model 1 (estimated with white coefficients) and 95 percent in model 2 (with the Hispanic coefficients).

Summary and Conclusions

This study uses Fairlie's decomposition method to investigate racial and ethnic disparity in the experience of food insufficiency among families with an infant in Oklahoma and estimates the portion of the between-group gaps explained by compositional differences in economic, noneconomic, and environmental characteristics. In this regard, the current study differs from existing studies that include measures of race and ethnicity as control variables. While the traditional approach indicates that rates of food insecurity are higher among minority groups than among whites, our approach is to test whether those higher rates are caused by socioeconomic disadvantage (compositional differences) or by something unique about minority groups (structural factors). This study uses a probability sample selected from birth certificates in that state; the sample is composed of sizeable subsamples of whites, African Americans, American Indians, and Hispanics. The current study is one of few studies on food scarcity that include a probability sample of American Indians. Another important contribution of this study is the examination of the roles of bank account and credit card ownership, because these are two types of economic resources not considered in previous studies.

The analyses produce several noteworthy results. First, the study finds that most of the racial and ethnic disparity in food insufficiency is explained by compositional differences between whites and minority groups. These results suggest that structural differences (differences in the associations between independent variables and food insufficiency by race and Hispanic origin) play a less important role in explaining disparities than do compositional differences. Specifying the role of socioeconomic disadvantage (compositional factors) has the potential to inform policy.

Second, credit card ownership is found to explain a substantial proportion of the disparity in food insufficiency, as are household income and home ownership. A white vs. African American disparity in bank account ownership is assessed to explain a considerable amount of the difference in experience of food insufficiency. The inclusion of the variables for bank account and credit card ownership may enhance understanding of why some low-income families experience food insufficiency and others with the same income level do not. Bank account ownership (a proxy for liquid asset ownership and an indicator of an established relationship with mainstream financial institutions) and credit card ownership (an indicator of access to credit markets) likely reduce a family's risk of food insufficiency by providing economic resources when current income is too low to meet family food needs.

Third, variation in noneconomic characteristics also is found to explain racial and ethnic disparity in food insufficiency, even though this study defines food insufficiency as food scarcity due solely to economic reasons, and the analyses control for economic resources. Differences in the levels of educational attainment and in proportions of native-born mothers are found to contribute considerably to racial and ethnic disparities.

Fourth, it is of interest that American Indians' chance of experiencing food insufficiency is found to be significantly lower than that of the two other minority groups, though the rate among American Indians is higher than among whites. It is unclear whether this finding is unique in the current sample (families with infants in Oklahoma), since no other study uses a probability sample to compare the experience of food insufficiency among American Indians with that among other minority groups. Gundersen (2008) investigates food insecurity among American Indians and

compares the rates with those for non–American Indians, but he does not conduct separate analyses for whites and other minority goups.

Notwithstanding its contributions, the current study has some limitations. First, the baseline survey of SEED OK did not include the USDA's full module for measuring food security (Bickel et al. 2000), and this study creates the food insufficiency variable from responses to one question. However, evidence suggests that the food insecurity question in SEED OK data provide a reasonable alternative to the use of the full food security module (Bickel et al. 2000). Second, the SEED OK study does not provide longitudinal data on food insufficiency. Thus, the current data do not permit examination of dynamic relationships between independent and dependent variables. Last, this study is not able to explain why low education and a high proportion of nonnative mothers are associated with high rates of food insufficiency. These relationships persist even in models that control for economic resources. It is possible that limited financial knowledge and management skills among low-educated and nonnative mothers may increase risk of food insufficiency, but in the absence of empirical evidence, this is speculative.

Several implications follow from findings of this study. In order to reduce racial and ethnic disparities in food insufficiency, policy makers should focus on differences between whites and minority groups in economic and noneconomic characteristics. Results suggest that future policy should expand access to credit among minority groups. Also, the findings imply that policy should try to reduce gaps in household income, home ownership, and bank account ownership. In addition, we suggest that policy makers pay special attention to low-educated and foreign-born minority mothers.

The findings call for further investigation of assets and access to credit. Although future investigations should consider how these factors affect food insufficiency in general, they also should examine the particular roles of assets and access to credit in racial and ethnic disparities in food insufficiency. In this study, both bank account and credit card ownership are associated with racial and ethnic disparities in food insufficiency. In light of these findings, the authors recommend that future research use more sophisticated measures to examine the roles of assets and access to credit. For example, subsequent efforts might measure financial assets, use of credit, and experiences with mainstream financial institutions (e.g., bank account opening and applications for mortgages, consumer loans, and credit cards).

Future research on noneconomic resources will also be worthwhile. Although this study identifies education and nativity status as factors contributing to racial and ethnic disparities in food insufficiency, the authors do not know how these characteristics might affect food insufficiency. Understanding why the risk of experiencing food insufficiency is high among low-educated and nonnative mothers could inform programs and policies to reduce food insufficiency among these populations.

References

Alaimo, K., Olson, C. M., & Frongillo, E. A., Jr. (2001a). Food insufficiency and American school-aged children's cognitive, academic, and psychosocial development. *Pediatrics*, *108*(1), 44–53.

Alaimo, K., Olson, C. M., & Frongillo, E. A. Jr. (2001b). Low family income and food insufficiency in relation to overweight in children: Is there a paradox? *Archives of Pediatrics & Adolescent Medicine, 155*(10), 1161–67.

Alaimo, K., Olson, C. M., Frongillo, E. A., Jr., & Briefel, R. R. (2001). Food insufficiency, family income, and health in US preschool and school-aged children. *American Journal of Public Health, 91*(5), 781–86. doi:10.2105/AJPH.91.5.781

Bartfeld, J., & Dunifon, R. (2006). State-level predictors of food insecurity among households with children. *Journal of Policy Analysis and Management, 25*(4), 921–42. doi:10.1002/pam.20214

Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (2000, March). *Guide to measuring household food security* (Report No. 6 in Measuring Food Security in the United States: Reports of the Federal Interagency Food Security Measurement Project). Washington, DC: U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis, Nutrition, and Evaluation.

Bronte-Tinkew, J., Zaslow, M., Capps, R., Horowitz, A., & McNamara, M. (2007). Food insecurity works through depression, parenting, and infant feeding to influence overweight and health in toddlers. *Journal of Nutrition, 137*(9), 2160–65.

Bureau of Labor Statistics. (2012, April 20). Labor force data by county, 2007 annual averages [Data from the Local Area Unemployment Survey]. Retrieved from ftp://ftp.bls.gov/pub/special.requests/la/laucnty07.txt.

Buescher, P. A., Gizlice, Z., & Jones-Vessey, K. A. (2005). Discrepancies between published data on racial classification and self-reported race: Evidence from the 2002 North Carolina live birth records. *Public Health Reports, 120*(4), 393–98.

Carasso, A., & McKernan, S. M. (2008). Asset holdings and liabilities. In S. M. McKernan & M. Sherraden (Eds.), *Asset building and low-income families* (33–66). Washington, DC: Urban Institute Press.

Casey, P. H., Szeto, K. L., Robbins, J. M., Stuff, J. E., Connell, C., Gossett, J. M., & Simpson, P. M. (2005). Child health-related quality of life and household food security. *Archives of Pediatrics and Adolescent Medicine, 159*(1), 51–56.

Charles, K. K., and Hurst, E. (2002). The transition to home ownership and the Black-White wealth gap. *Review of Economics and Statistics, 84*(2), 281–97. doi:10.1162/003465302317411532

Coleman-Jensen, A., Nord, M., Andrews, M., & Carlson, S. (2011, September). *Household food security in the United States in 2010* (Economic Research Report No. 125). Washington, DC: U.S. Department of Agriculture, Economic Research Service.

Curtin, R. T., Presser, S., & Singer, E. (2005). Changes in telephone survey nonresponse over the past quarter century. *Public Opinion Quarterly, 69*(1), 87–98. doi:10.1093/poq/nfi002

Cutts, D. B., Pheley, A. M., & Geppert, J. S. (1998). Hunger in midwestern inner-city young children. *Archives of Pediatrics & Adolescent Medicine, 152*(5), 489–93.

Dixon, L. B., Winkleby, M. A., & Radimer, K. L. (2001). Dietary intakes and serum nutrients differ between adults from food-insufficient and food-sufficient families: Third National Health and Nutrition Examination Survey, 1988–1994. *Journal of Nutrition, 131*(4), 1232–46.

Fairlie, R. W. (1999). The absence of the African-American owned business: An analysis of the dynamics of self-employment. *Journal of Labor Economics, 17*(1), 80–108. doi:10.1086/209914

Fairlie, R. W. (2005). An extension of the Blinder-Oaxaca decomposition technique to logit and probit modes. *Journal of Economic and Social Measurement,* 30(4), 305–16.

Gershoff, E. T., Aber, J. L., Raver, C. C., & Lennon, M. C. (2007). Income is not enough: Incorporating material hardship into models of income associations with parenting and child development. *Child Development 78*(1): 70–95. doi:10.1111/j.1467-8624.2007.00986.x

Gundersen, C. (2008). Measuring the extent, depth, and severity of food insecurity: An application to American Indians in the USA. *Journal of Population Economics, 21*(1), 191–215. doi:1007/s00148-007-0152-9

Heflin, C. M., Corcoran, M. E., & Siefert, K. A. (2007). Work trajectories, income changes, and food insufficiency in a Michigan welfare population. *Social Service Review, 81*(1), 3–25. doi:10.1086/511162

Heflin, C. M., & Butler, J. S. (Forthcoming). Why do women enter and exit from material hardship? *Journal of Family Issues*. Advance online publication. doi:10.1177/0192513X12442822

Hoddinott, J., Maluccio, J. A., Behrman, J. R., Flores, R., & Martorell, R. (2008). Effect of a nutrition intervention during early childhood on economic productivity in Guatemalan adults. *The Lancet, 371*(9610), 411–16. doi:10.1016/S0140-6736(08)60205-6

Jyoti, D. F., Frongillo, E. A., Jr., & Jones, S. J. (2005). Food insecurity affects school children's academic performance, weight gain, and social skills. *Journal of Nutrition, 135*(1), 2831–39.

Kaiser, L., Baumrind, N., & Dumbauld, S. (2007). Who is food-insecure in California? Findings from the California Women's Health Survey, 2004. *Public Health Nutrition, 10*(6), 574–81. doi:10.1017/S1368980007382542

Keeter, S., Kennedy, C., Dimock, M., Best, J., & Craighill, P. (2006). Gauging the impact of growing nonresponse on estimates from a national RDD telephone survey. *Public Opinion Quarterly, 70*(5), 759–79. doi:10.1093/poq/nfl035

Keister, L. A. (2000). *Wealth in America: Trends in wealth inequality*. Cambridge: Cambridge University Press.

Kleinman, R. E., Murphy, J. M., Little, M., Pagano, M., Wehler, C. A., Regal, K., & Jellinek, M. S. (1998). Hunger in children in the United States: Potential behavioral and emotional correlates. *Pediatrics, 101*(1), e3. http://www.pediatrics.org/cgi/content/full/101/1/e3

Krivo, L. J., & Kaufman, R. L. (2004). Housing and wealth inequality: Racial-ethnic differences in home equity in the United States. *Demography, 41*(3), 585–605. doi:10.1353/dem.2004.0023

Laraia, B. A., Siega-Riz, A. M., Gundersen, C., & Dole, N. (2006). Psychosocial factors and socioeconomic indicators are associated with household food insecurity among pregnant women. *Journal of Nutrition, 136*(1), 177–82.

Liao, Y., Tucker, P., Okoro, C. A., Giles, W. H., Mokdad, A. H., & Bales Harris, V. (2004, August 27). *REACH 2010 surveillance for health status in minority communities—United States, 2001–2002* (Morbidity and Mortality Weekly Report Surveillance Summaries 53, No. SS-6). Atlanta, GA: Centers for Disease Control and Prevention.

Marks, E. L., Rhodes, B. B., & Scheffler, S. (2008). *SEED for Oklahoma Kids: Baseline Analysis* (Report to the Ford Foundation, Projects No. 0210202 & No. 0211625). Research Triangle Park, NC: RTI International.

Mayer, S. E., & Jencks, C. (1989). Poverty and the distribution of material hardship. *Journal of Human Resources, 24*(1), 88–114.

Nam, Y., Huang, J., & Sherraden, M. (2008). Asset definitions. In S. M. McKernan & M. Sherraden (Eds.), *Asset building and low-income families* (1–31). Washington, DC: Urban Institute Press.

Nam, Y., Kim, Y., Clancy, M., Zager, R., & Sherraden, M. (2012). Do child development accounts promote account holding, saving, and asset accumulation for children's future? Evidence from a statewide randomized experiment. *Journal of Policy Analysis and Management*. Advance online publication. doi:10.1002/pam.21652

Nord, M., Coleman-Jensen, A., Andrews, M., & Carlson, S. (2010, November). *Household food security in the United States, 2009* (Economic Research Report No. 108). Washington, DC: U.S. Department of Agriculture, Economic Research Service.

Nord, M., Kabbani, N., Tiehen, L., Andrews, M., Bickel, G., & Carlson, S. (2002, March). *Household food security in the United States, 2000* (Food Assistance and Nutrition Research Report No. 21). Washington, DC: U.S. Department of Agriculture, Economic Research Service, Food and Rural Economics Division.

Nord, M., and Romig, K. (2006). Hunger in the summer: Seasonal food insecurity and the national school lunch and summer food service programs. *Journal of Children and Poverty, 12*(2), 141–58. doi:10.1080/10796120600879582

Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. *International Economic Review, 14*(3), 693–709.

Ribar, D. C., & Hamrick, K. S. (2003, September). *Dynamics of poverty and food sufficiency* (Food Assistance and Nutrition Research Report No. 36). Washington, DC: U.S. Department of Agriculture, Economic Research Service.

Rose, D., Gundersen, C., & Oliveira, V. (1998, September). *Socio-economic determinants of food insecurity in the United States: Evidence from the SIPP and CSFII datasets* (Technical Bulletin No. 1869). Washington, DC: U.S. Department of Agriculture, Economic Research Service.

Scott, R. I., & Wehler, C. A. (1998, September). *Food insecurity/food insufficiency: An empirical examination of alternative measures of food problems in impoverished U.S. households* (Discussion Paper No. 1176-98). Madison, WI: University of Wisconsin, Institute for Research on Poverty.

Shapiro, T. M. (2004). *The hidden cost of being African-American: How wealth perpetuates inequality*. New York, NY: Oxford University Press.

Sharkey, J. R., & Schoenberg, N. E. (2005). Prospective study of Black-White differences in food insufficiency among homebound elders. *Journal of Aging and Health, 17*(4), 507–27. doi:10.1177/0898264305279009

State of Oklahoma, Deputy Treasurer for Policy and Administration. (n.d.). *Population by zip code tabulation area: 2000* [Data table]. Oklahoma City, OK: State Treasurer's Office.

Stuff, J. E., Horton, J. A., Bogle, M. L., Connell, C., Ryan, D., Zaghloul, S., Thornton, A., Simpson, P., Gossett, J., & Szeto, K. L. (2004). High prevalence of food insecurity and hunger in households in the rural lower Mississippi delta. *Journal of Rural Health, 20*(2), 173–80. doi:10.1111/j.1748-0361.2004.tb00025.x

U.S. Census Bureau, Geography Division. (2011). *ZIP code tabulation areas (ZCTAs)*. Retrieved from http://www.census.gov/geo/ZCTA/zcta.html

Whitaker, R. C., Phillips, S. M., & Orzol, S. M. (2006). Food insecurity and the risks of depression and anxiety in mothers and behavioral problems in the preschool-aged children. *Pediatrics, 118*(3), e859–e868. doi:10.1542/peds.2006-0239

Yu, M., Lombe, M., & Nebbitt, V. E. (2010). Food Stamp Program participation, informal supports, household food security and child food security: A comparison of African American and Caucasian households in poverty. *Children and Youth Services Review, 32*(5), 767–73. doi:10.1016/j.childyouth.2010.01.015